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BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Application Number: 09/550,598
Filing Date: April 17, 2000
Appellant(s): OHTANI ET AL.

Eric J. Robinson
For Appellant

EXAMINER'S ANSWER

This is in response to the appeal brief filed 4/13/05 appealing from the Office action on 5/18/04.

(1) Real Party in Interest

A statement identifying the real party in interest is contained in the brief.

(2) Related Appeals and Interferences

The examiner is not aware of any related appeals, interferences, or judicial proceedings which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

(3) Status of Claims

The statement of the status of the claims contained in the brief is correct.

This appeal involves claims 1, 2, 4, 5, 7, 9, 11, 12, 14, 18, 20-27, and 29.

Claims 3, 6, 8, 10, 13, 15-17, 19 and 28 have been canceled.

(4) Status of Amendments After Final

The appellant's statement of the status of amendments after final rejection contained in the brief is correct.

The amendment after final rejection filed on 4/13/05 has been entered (claim 28 has been canceled).

(5) Summary of Claimed Subject Matter

The summary of invention contained in the brief is correct.

(6) Ground of Rejection to be Review on Appeal

The appellant's statement of the grounds of rejection to be review on appeal contained in the brief is correct.

(7) Claims Appendix

The copy of the appealed claims contained in the Appendix to the brief is correct.

(8) Evidence Relied Upon

U.S. 5,706,064	FUKUNAGA ET AL.	1-1998
U.S. 6,400,428	IZUMI	6-2002
U.S. 5,536,950	LIU ET AL.	7-1996
U.S. 5,948,705	JUN	9-1999
U.S. 6,221,140	KOBAYASHI ET AL.	4-2001

(9) Grounds of Rejection

The following ground(s) of rejection are applicable to the appealed claims:

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. Claims 1, 5, 7, 9, 14, 18, and 20-27 and 29 are rejected under 35 U.S.C. 103(a) as being unpatentable over Fukunaga et al (US. 5,706,064) in view of Liu et al (US. 5,536,950) and Izumi (US. 6,400,428).

With respect to claims 1, 5, 7, 9, 14, 18, and 27 and 29, Fukunaga (Figs. 24A - 24G) discloses a method for producing a semiconductor device having an active matrix display device, comprising: forming a first conductive layer 405; forming an insulating layer (413,414) over the first conductive layer; forming an opening in the insulating layer to expose the first conductive layer 405 at a bottom of the opening; forming an

embedded conductive layer 418 to cover the insulating layer and the opening (Fig. 24E); etching the embedded conductive layer 418 (Fig. 24F); and forming a second conductive layer on the insulating layer and the embedded conductive layer; and forming a pixel electrode 412 by patterning the second conductive layer (column 26, lines 46-48); wherein the embedded conductive layer 418 or 411b comprises an organic resin film made of polymer (column 26, lines 54-61) or carbon (column 20, lines 36-48), and wherein the embedded conductive layer 418 or 411b is further made of inorganic oxide conductive layer of ITO or ZnO (column 30, lines 43-46 and column 5, lines 66-67 through column 6, lines 1-3).

Fukunaga does not disclose the embedded conductive layer 418 is etched to expose a portion of the insulating layer.

However, Liu (Fig. 4G) teaches the steps of depositing the embedded conductive layer 82 in the opening, followed by planarization to expose the surface of the insulating layer 78 and depositing and patterning the pixel electrode 24 on the embedded conductive layer 82 (column 5, lines 30-39). Accordingly, it would have been obvious to etch or polish the embedded conductive layer 418 of Fukunaga to expose a portion of the insulating layer in order to provide a unique body tie arrangement for achieving a compact and high reliability display, as taught by Liu (column 2, lines 57-67 through column 3, lines 1-12). Furthermore, it also would have been obvious to form Fukunaga's pixel electrode either as a transparent electrically conductive film or as a reflective electrically conductive film, depending upon the desired display device type for the liquid crystal display device, as taught by Izumi (column 6, lines 15-20).

With respect to claims 20-26, Fukunaga also teaches (column 1, lines 5-30) that because the liquid crystal display device has high image quality and can be used as switching elements, this kind of display device has been widely used as a display device

in a personal computer, television or the like. Accordingly, it would have been obvious to apply the display device of Fukunaga specifically to a cellular phone, a camcorder, etc., in view of the broad device application disclosure in Fukunaga.

3. Claims 2 and 11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Fukunaga et al in view of Liu et al, Izumi and Kobayashi et al (US, 6,221,140).

As discussed in details above, claims 2 and 11 read on the combination of Fukunaga, Liu and Izumi, except the applied references do not disclose that the embedded oxide conductive layer may be formed by a spin coating method.

However, Kobayashi (column 2, lines 34-48) teaches the forming of an oxide conductive layer by a spin coating method to cover the substrate and the opening. Accordingly, it would have been obvious to form the embedded oxide conductive layer 418 (Fig. 24E) of Fukunaga specifically by spin coating because according to Kobayashi, such method reduces the manufacturing cost (column 2, lines 24-33) and results in uniform coating of the substrate.

4. Claims 4 and 12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Fukunaga et al in view of Izumi, Jun (US. 5,948,705) and Kobayashi et al (US. 6,221,140).

Fukunaga (Figs. 24A - 24G) discloses a method for producing a semiconductor device having an active matrix display device, comprising: forming a first conductive layer 405; forming an insulating layer 413 over the first conductive layer; forming an opening in the insulating layer to expose the first conductive layer at a bottom of the opening; forming an oxide conductive layer of ITO or ZnO (column 30, lines 43-46 and column 5, lines 66-67 through column 6, lines 1-3) to cover the insulating layer and the opening; forming a second conductive layer 412 on the oxide conductive layer; and

patterning the second conductive layer to form a pixel electrode. It is noted that forming pixel electrode that are either transparent or reflective would have been an expectant obvious in this art because the choice depends on the desired display device for the liquid crystal display device (see Izumi, column 6, lines 15-20).

Fukunaga does not disclose the step of etching the oxide conductive layer by using the second conductive layer as a mask.

However, Jun '705 teaches a step of etching the embedded conductive layer 46' by using the second conductive layer 48 as a mask in a self-alignment manner (Figs. 4D - 4E and column 7, lines 25-30). Accordingly, it would have been obvious to modify the process of Fukunaga by etching the embedded conductive layer 418 using the process as set forth above in order to prevent deterioration of the step coverage in the contact hole and the recess formation in the contact hole, as taught by Jun '705 (column 7, lines 35-44).

Furthermore, in view of the teachings of Kobayashi (column 2, lines 34-48), it also would have been obvious to form the embedded oxide conductive layer 418 of Fukunaga by spin coating because according to Kobayashi, such method reduces in manufacturing cost (column 2, lines 24-33) and results in uniform coating of the substrate.

(10) Response to Argument.

Claims 1, 5, 7, 9, 14, 18, 20-27 and 29 as obvious based on the combination of Fukunaga , Liu and Izumi. Claims 2 and 11 as obvious based on the combination of Fukunaga, Liu, Izumi and Kobayashi. Claims 4 and 12 as obvious based on the combination of Fukunaga, Izumi, Jun and Kobayashi

Appellant (pages 5-10 of Brief) argues that even though Izumi teaches the use of a transparent pixel electrode for a light transmitting type display device and the use of a reflective pixel electrode for a reflective type display device, it would not be obvious to change Fukunaga's device or Liu's device from a transmitting type display device to a reflective type display device by replacing Fukunaga's transparent pixel electrode or Liu's transparent pixel electrode with the reflective pixel electrode.

These arguments are not persuasive because of the following reasons:

First, it appears that Appellant has misinterpreted the teachings of the references based on the combination of Fukunaga, Liu and Izumi. Izumi does not teach the changing of a reflective pixel electrode into the transmitting type LCD device as asserted by Appellant, but rather, Izumi (Fig. 3) teaches the forming of a single generic LCD substrate panel which can be used for either a transmitting type LCD device or a reflective type LCD device by choosing the appropriate material of the pixel electrode for the LCD substrate panel. As taught by Izumi's Fig. 3, the single LCD substrate panel 10, including a matrix of transistors 16 and their associated pixel electrodes 15, can be used as a transmitting LCD substrate panel in a transmitting type LCD device by using a transparent conductive film for the pixel electrode 15, and it also can be used as a reflective LCD substrate panel in a reflective type LCD device by using a reflective conductive film for the pixel electrode 15. Specifically, Izumi states in column 6, lines 14-19 that:

> "Each pixel electrode 15 is a transparent electrically conductive film made of ITO (Indium Tin Oxide) or the like when used for a light transmitting type display

device and a reflective electrically conductive film made of aluminum (Al) or the like when used for a reflecting type display device."

It is noted that Fukunaga (Fig. 24G) also discloses an LCD substrate panel (see column 3, lines 7-9), which is equivalent to the LCD substrate panel 10 of Izumi's Fig. 3. The LCD substrate panel of Fukunaga (Fig. 24G) includes a matrix of transistors and their associated pixel electrodes 412. Similarly, Liu (Fig. 1) also discloses an LCD substrate Panel 10 that is equivalent to the LCD substrate panel 10 of Izumi's Fig. 3. The LCD substrate panel 10 of Liu includes a matrix of transistors 22 and their associated pixel electrodes 24 (also see Fig. 3 and Fig. 4G for sectional views of LCD substrate panel 10). Therefore, in view of teachings of Izumi (as discussed above), the LCD substrate panel of Fukunaga or the LCD substrate panel 10 of Liu can be used as a transmitting LCD substrate panel or a reflective LCD substrate panel for either transmitting type LCD device or reflective type LCD device, respectively. In other words, the LCD substrate panel of Fukunaga and the LCD substrate panel 10 of Liu are not used only for the transmitting type LCD device; alternatively the LCD substrate panel of Fukunaga and the LCD substrate panel 10 of Liu can be used for the reflective type LCD device by using a reflective conductive film for the pixel electrode as suggested by Izumi. Thus, using the LCD substrate panel suggested from the combination of Fukunaga and Liu, within the meaning of 35 U.S.C. 103, for either the reflective type LCD device or the transmitting type LCD device would have been obvious because it would depend upon the conductive material type which is used for the panel pixel electrode, as taught by Izumi.

Second, the examiner specifically notes the following admission at page 31, lines 15-25 of **Appellant's specification**:

> "**While an AMLCD driven in a reflection mode** is exemplified in Examples 1 to 9, **the invention can be applied to an AMLCD driven in a transmission mode ... In order to produce a transmission type AMLCD, a transparent conductive film** (typically an ITO film and a tin oxide film) **is used as the pixel electrode**." [Emphasis added].

This Appellant's admission appears to support the contention in this Answer that the LCD substrate panel of Fukunaga or the LCD substrate panel 10 of Liu can be used as either in the transmitting LCD mode or in the reflective LCD mode, depending upon the conductive material type used for the substrate panel pixel electrode.

Third, it is not controverted that the LCD substrate panel disclosed in instant Fig. 5C can be used as a reflective LCD substrate panel or as a transmitting LCD substrate panel, depending upon the material which is used for the pixel electrode of the LCD substrate panel (see Appellant's specification, page 31, lines 15-25). However, it is unclear why the Appellant's LCD panel can be used in both reflective type LCD device and transmitting type LCD device, while the LCD substrate panel disclosed by Fukunaga or Liu cannot.

(11) Related Proceeding(s) Appendix

No decision rendered by a court or the Board is identified by the examiner in the Related Appeals and Interferences section of this examiner's answer.

(12) Evidence Appendix

The Brief does not contain an Evidence appendix. However, there is no evidence of record pursuant to 37 CFR sections. 1.130, 1.131, 1.132.

For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,

PC
June 2, 2005

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